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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,390	06/28/2005	Taishi Tsuji	Q83773	5831

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EXAMINER	
NELSON, MICHAEL E	

ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/509,390	TSUJI ET AL.	
	Examiner	Art Unit	
	MICHAEL E. NELSON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) *6-13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/04/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of claims

1. Claims 1-14 are pending. Claim 4 has been amended to remove a multiple dependency. Applicant's election of group 1 is maintained from the original office action of 10/17/2007. Claims 6-13 have been withdrawn from consideration, and claims 1-5 and 14 are examined.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

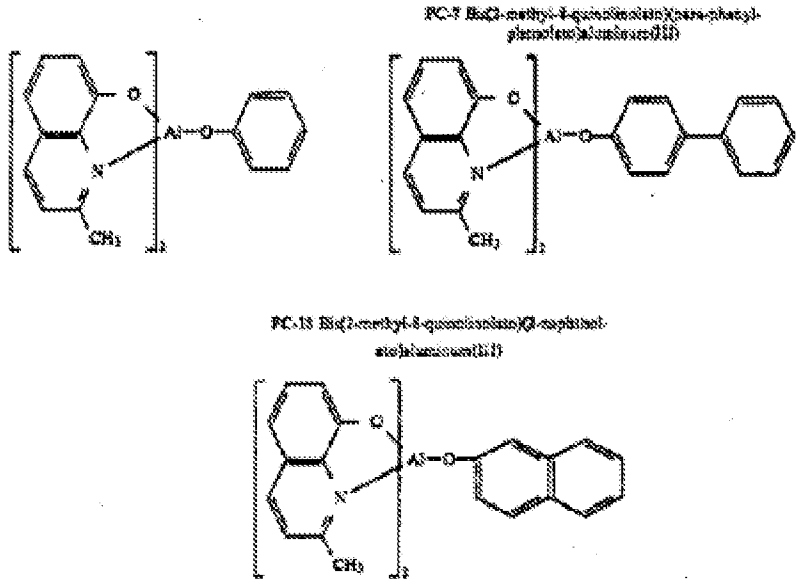
> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Slyke et al. (5,150,006) in view of Shunk et al. (Journal of the American Chemical Society, v. 71, no. 12, December 1949).

4. Concerning claim 14, Van Slyke et al. describe an electroluminescent device comprised of material with the following structure, where Q represents a substituted 8-quinolinolato ligand, R^5 represents a substituent on the 8-quinolinolato ligand, O-L is a phenolato ligand, and L is a hydrocarbon of 6-24 carbon atoms. (column 8, lines 16-28)

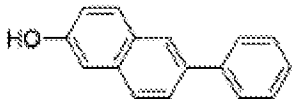
(II) $(R^5\text{-}Q)_2\text{-}Al\text{-}O\text{-}L$

5. Van Slyke et al. discloses the following specific examples (columns 12, 13 and 15).



6. Van Slyke et al. further disclose that the compounds are derived from HO-L phenols, where L is a hydrocarbon from 6-24 carbon atoms comprised of a phenyl moiety. (column 9, lines 10-12) Furthermore, they report that there is little advantage to be gained with very large ligands, but that ligands with up to 18 aromatic ring carbons have revealed high levels of stability, and therefore the preferred ligands have between 7 and 18 total carbon atoms. (column 9, lines 18-24) Van Slyke et al. clearly describe compounds with a naphthalene ring (as shown in the third structure above) as the first ring of the phenolic ligand, and also describe compounds with a phenyl substituent pendant off of the first ring of the phenolic ligand (shown in the second structure above). Van Slyke et al. are silent on the use of the specific phenyl substituted naphthalene ligand shown below.

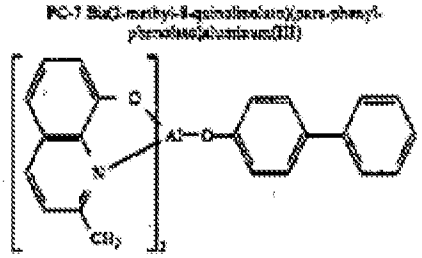
7. Shunk et al. disclose the synthesis of a substituted phenolic compound with the following structure.



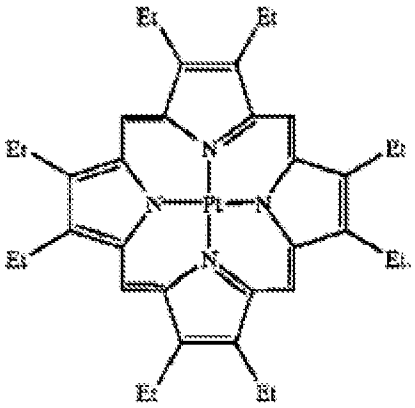
8. Based on the general teaching by Van Slyke et al. that the ligand should contain from 7-18 carbons (this ligand has 16 carbons), and the fact that larger ligands exhibit higher stability, and the fact that the precursor phenolic compound is known in the literature, it would have been obvious to one of ordinary skill in the art to synthesize the structure shown below with the intent of improving stability by increasing the size of the phenolate ligand.

9. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haase et al. (6,791,258) in view of Van Slyke et al. (5,150,006) and further in view of Shunk et al. (Journal of the American Chemical Society, v. 71, no. 12, December 1949).

10. Concerning claims 1-5, Haase et al. describe the production of a multicolor electroluminescent device comprising parts from Fig. 2 and column 4, lines 1-26, including an anode (42), a hole injection layer (46), hole transport layer (48), an electron transport layer (50), an electron injection layer (52) and a cathode (54), where the electron transport layer is comprised of BAlq (shown below), and where the electron



transport layer also serves as the host for a dopant, depending on the desired color, specifically the phosphorescent platinum octaethylporphyrin (PtOEP) (shown below). (column 4, line 49). Haase et al. further disclose that a second electron transport layer (not shown) may be deposited over a doped electron transport layer to improved electron injection (column 4, lines 61-64). Haase et al. are silent on the use of the specific aluminum complex as the host compound.



11. Van Slyke et al. (with support by Shunk et al.) teach that the specific aluminum complex is an obvious variant of the aluminum complexes reported by Van Slyke et al. as discussed above. Therefore, it would have been obvious to one of ordinary skill in the art to utilize the compound envisaged by Van Slyke et al. in an electroluminescent

device as described by Haase et al. since the compound would be predicted to have improved stability (as discussed above) and function in the same manner.

12. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson et al. (6,303,238) in view of Van Slyke et al. (5,150,006) and further in view of Shunk et al. (Journal of the American Chemical Society, v. 71, no. 12, December 1949) and Baldo et al. (Physical Review B, v. 62, no. 16, pp. 10958-10966, Oct. 2000).

13. Concerning claims 1-5, Thompson et al. describes an electroluminescent device comprised of an anode, a hole transporting layer, an electron transporting layer and a cathode layer, where the emissive layer is between the electron transporting and hole transport layer (claim 41), where the emissive layer comprises a charge carrying host material and a phosphorescent material (claim 26), where the phosphorescent material is platinum octaethylporphine (claim 18). The charge transporting host material is an electron transport material (claim 31). Thompson et al. are silent on the use of the specific phenolato aluminum complexes as the host material for the electroluminescent device. Thompson et al. further disclose that a hole injection layer may be present between the anode layer and the hole transport layer, and that an electron injection layer may be present between the cathode and the electron transport layer. (column 10, lines 1-5)

14. Van Slyke et al. (with support by Shunk et al.) teach that the specific aluminum complex is an obvious variant of the aluminum complexes reported by Van Slyke et al. as discussed above. Furthermore, Van Slyke teach that the aluminum compounds are

electron transporting compounds (column 8, lines 8-10), produce blue electroluminescence (title, abstract, table 1) and also serve as hosts for fluorescent dopants (column 17, lines 45-48).

15. Baldo et al. teach the nature of energy transfer between host compounds and phosphorescent dopants, and discuss the effect of the difference in triplet energy between the host and the guest material (section IV). In such, they disclose that when the difference between the triplet energy of the host and the dopant is large, then triples are strongly confined on the guest, and therefore phosphorescence efficiency is high, since triplets are not lost back to the host material. Furthermore, in cases where the energy of the guest is less than the host, but not by a large amount (Baldo et al. specifically disclose PtOEP doped in Alq_3) that significant populations of both guest and host triplets are present. Therefore, a greater difference in triplet energy between the host and the guest compounds results in an increase in phosphorescence efficiency.

16. While the triplet energy of the phenolato aluminum complexes are not specifically disclosed, they can be inferred, relative to Alq_3. The phenolato aluminum compounds are known blue fluorescence emitters, therefore the energy difference between the HOMO and LUMO state is greater than the energy difference between the HOMO and LUMO state of the green emitting Alq_3. As a result, it would be reasonable to predict that the triplet energy of the phenolate aluminum compounds would be greater than the triplet energy of Alq_3.

17. Since the triplet energy of the phenolato aluminum compounds is greater than the triplet energy of Alq_3 (as discussed above), and also electron transport materials (as

discussed above), based on the teaching by Baldo et al. that a greater difference between the triplet energy of the host material and the triplet energy of the guest results in an increase in phosphorescence efficiency, it would have been obvious to one of ordinary skill in the art to use the phenolato aluminum compound envisioned by Van Slyke in an electroluminescent device described by Thompson et al. for the purpose of improving phosphorescence efficiency.

Double Patenting

18. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

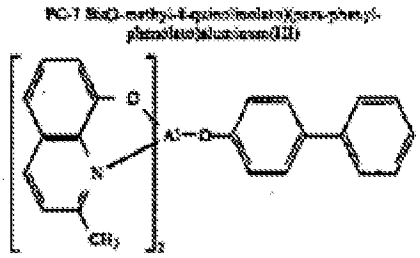
A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

19. Claims 1-5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 3,5,11,12, and 15 of copending Application No. 10/282244 in view of Van Slyke et al. (5,150,006)

This is a provisional obviousness-type double patenting rejection.

20. Application No. 10/282244 claims an electroluminescent device with an anode, cathode, a hole transport layer, light emitting layer and an electron transport layer, where the light emitting layer comprises an organic host material and phosphorescent guest, where the difference in ionization energy between the host and hole transport layer is 0.4-0.8 eV, and the host is an aluminum chelate compound (claim 3), specifically the following structure (claim 5). Where the device further comprises a hole injection layer (claim 11), or an electron injection layer (claim 12), and the phosphorescent guest is a platinum porphine compound (claim 15).



21. Since the instant application is not limited with regards to the difference in the ionization potential between the host compound and the hole transport compound, and since the compound claimed in the instant application is an obvious variant of the compound shown above in view of Van Slyke et al. (as discussed above), it would have been obvious to one of ordinary skill in the art to arrive at the current invention.

Claims 1-5 are directed to an invention not patentably distinct from claims 3,5,11,12, and 15 of commonly assigned Application No. 10/282244. See Discussion above.

The U.S. Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP Chapter 2300). Commonly assigned Application No. 10/282244, discussed above, would form the basis for a rejection of the noted claims under 35 U.S.C. 103(a) if the commonly assigned case qualifies as prior art under 35 U.S.C. 102(e), (f) or (g) and the conflicting inventions were not commonly owned at the time the invention in this application was made. In order for the examiner to resolve this issue, the assignee can, under 35 U.S.C. 103(c) and 37 CFR 1.78(c), either show that the conflicting inventions were commonly owned at the time the invention in this application was made, or name the prior inventor of the conflicting subject matter.

A showing that the inventions were commonly owned at the time the invention in this application was made will preclude a rejection under 35 U.S.C. 103(a) based upon the commonly assigned case as a reference under 35 U.S.C. 102(f) or (g), or 35 U.S.C. 102(e) for applications pending on or after December 10, 2004.

22. Claims 1-5 are provisionally rejected under 35 U.S.C. 103(a) as being obvious over copending Application No. 10/282244 which has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the copending application, it would constitute prior art under 35 U.S.C. 102(e) if published or patented. This provisional rejection under 35 U.S.C. 103(a) is based upon a presumption of future publication or patenting of the conflicting application. See discussion above.

This provisional rejection might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the copending application was

derived from the inventor of this application and is thus not the invention "by another," or by a showing of a date of invention for the instant application prior to the effective U.S. filing date of the copending application under 37 CFR 1.131. This rejection might also be overcome by showing that the copending application is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Response to Arguments

23. Objections to the specification have been withdrawn in light of Applicant's amendments.

24. Objections to claims 4 and 5 for being improper multiple dependent claims have been withdrawn in light of Applicant's amendment to claim 4.

25. Provisional rejection of claims 1-3 and 14 on the ground of nonstatutory obviousness-type double patenting over Application No. 10/566725 is withdrawn due to the filing and acceptance of a terminal disclaimer.

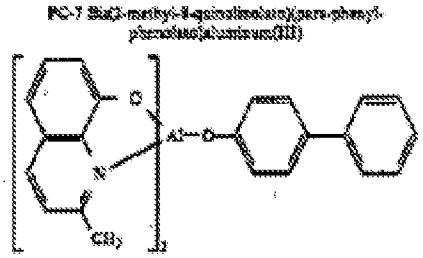
26. Applicant's arguments filed 1/15/2008 have been fully considered but they are not persuasive.

27. In response to applicant's argument that Shunk et al. is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed

invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Shunk et al. serves to provide evidence that a chemical precursor is known in the chemical literature. One of ordinary skill in the art is the organic chemist who is making the compound in question, and as such the field of endeavor is organic synthesis, rather than electroluminescent devices. It is well within the level of ordinary skill to search chemical compounds by structure or substructure and locate compounds which have been published and indexed in the chemical databases. Therefore, even though Shunk et al. deals with the synthesis of steroid analogs, and not electroluminescent compounds, it would be well within the level of ordinary skill in the art for an Organic Chemist searching for phenolic compounds to locate and identify a chemical precursor described by Shunk et al., and to use that compound in the synthesis of an analog of the compounds described by Van Slyke et al. resulting in a new, but not non-obvious aluminum chelate molecule.

28. In response to Applicants arguments in section IV of Applicant's response, concerning Haase et al., Applicant argues that Haase et al. does not teach all of the features of the claims, specifically that Haase et al. does not disclose a separate electron transport layer from the electron transporting, light-emitting layer. However, as stated in the original office action, Haase et al. teaches an electroluminescent device:

> including an anode (42), a hole injection layer (46), hole transport layer (48), an electron transport layer (50), an electron injection layer (52) and a cathode (54), where the electron transport layer is comprised of BAlq (shown below), and where the electron



transport layer also serves as the host for a dopant, depending on the desired color, specifically the phosphorescent platinum octaethylporphyrin (PtOEP) (shown below). (column 4, line 49). Haase et al. further disclose that **a second electron transport layer (not shown) may be deposited over a doped electron transport layer to improved electron injection** (column 4, lines 61-64). (emphasis added)

29. While an electron transporting layer serves as the host layer, it is also the light-emitting layer. Haase et al. clearly teaches the electron injection layer (which is also an electron transporting layer, and furthermore teaches a separate (second) electron transporting layer, as indicated above. The prior art is not limited to the specific examples shown, but to the entire teaching of the document. As such, Haase et al. clearly teaches all the layers of Applicant's claims.

30. Haase et al. is silent on the use of the specific compound of claim 1 as the host material. However, as has been discussed before, the compound of claim 1 is an obvious variant of the compounds described by Van Slyke et al., which include BAlq disclosed by Haase et al. Therefore, it would have been obvious to one of ordinary skill to use the compound as the host material in the **light emitting** layer.

31. In response to Applicant's argument in section V of Applicant's response. Applicant states that Thompson does not teach the layered structure of Applicant's claim 1. The original office action in paragraph 22 clearly states:

> Thompson et al. describes an electroluminescent device comprised of an anode, a hole transporting layer, an electron transporting layer and a cathode layer, where the emissive layer is between the electron transporting and hole transport layer (claim 41), where the emissive layer comprises a charge carrying host material and a phosphorescent material (claim 26), where the phosphorescent material is platinum octaethylporphine (claim 18). The charge transporting host material is an electron transport material (claim 31).

32. Thompson et al. further teaches the use of a hole injection layer and an electron injection layer, and describes by example the use of Alq_3 as the electron transporting host material. Again, the prior art is not limited to the specific examples disclosed, but to the teaching as a whole. Clearly, Thompson et al. teaches all of the layers of the device of claims 1-3. Thompson et al. is silent on the use of the specific phenolato aluminum compound as the host material. Baldo et al. teaches that host compounds with larger energy gaps are preferable as host materials, since the triplet excitons are confined on the dopant, and specifically teaches that PtOEP doped in Alq_3 suffers from the drawback that triplet excitons are present on the host material as well, resulting in reduced phosphorescence efficiency.

33. The phenolato aluminum compounds described by Van Slyke et al. are known electron transporting compounds, and known hosts for fluorescent dopants, as described by Van Slyke et al., and are predicted to have a greater energy gap than Alq_3 since they are known to emit blue light, while Alq_3 emits green light. Therefore, it would have been obvious to one of ordinary skill to use the phenolato aluminum compounds described by Van Slyke et al. as the host material in an electroluminescent device described by Thompson et al., and since the compound of Applicant's formula (I) is an obvious variant of the compounds described by Van Slyke et al. it would likewise be

obvious to one of ordinary skill to use that compound as the host material of an electroluminescent device described by Thompson et al.

34. In response to arguments in section VI of Applicant's response, concerning double patenting rejections against co-pending application 10/282,244. The application clearly teaches the use of the phenolato aluminum compounds as host materials for phosphorescent dopants in an electroluminescent device, the same compounds described by Van Slyke et al.. Since the phenolato aluminum compound of Applicant's formula (I) is an obvious variant of the compounds described by Van Slyke et al., as discussed above, one of ordinary skill in the art would arrive at the current invention by using the phenolato aluminum analog envisioned by Van Slyke et al. in the device of Application 10/282,244.

Conclusion

35. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL E. NELSON whose telephone number is (571)270-3453. The examiner can normally be reached on M-F 7:30am-5:00pm EST (First Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on 571-272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael E. Nelson
Examiner
Art Unit 1794

/Callie E. Shosho/
Supervisory Patent Examiner, Art Unit 1794